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ComEd

July 16, 1997

United States Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: NRC Document Control Desk

Subject: Byron Nuclear Power Station, Units 1 and 2
Facility Operating Licenses NPF-37 and NPF-66
NRC Docket Numbers: 50-454 and 50-455

"Supplemental Response to Request for Additional Information"

References:

1. J. Hosmer letter to the Nuclear Regulatory Commission dated January 31, 1997, transmitting Technical Specification Amendment Request for Specific Activity

2. D. Lynch letter to I. Johnson dated May 2, 1997, transmitting Request for Additional Information Pertaining to the Proposed Reduction in the Maximum Allowable Dose Equivalent Iodine-131 Concentration

3. J. Hosmer letter to the Nuclear Regulatory Commission dated May 23, 1997, transmitting Response to Request for Information.

Reference 1 transmitted the Commonwealth Edison Company's (ComEd) request to amend the technical specification to allow for the reduction in the allowable dose equivalent iodine concentration in the reactor coolant for Byron Unit 1. Subsequent to that submittal, the Nuclear Regulatory Commission (NRC) issued a Request for Additional Information (RAI) (Reference 2). ComEd provided their response in Reference 3. The attachment supersedes ComEd's response to RAI Question 1, which addressed the Murphy-Campe equation that was used in the determination of the maximum X/Q values.

The supplemental response differs from that previously submitted:

> The table presented in Reference 3 response to Question 1 contained effective wind speeds (u-eff), not actual input value of the wind speed (u) as presented in the attached supplement to Question 1. An effective wind speed, "u-eff," is the input value of the wind speed, "u," adjusted to account for the containment diameter and the distance from the containment surface to the control room intake used in the Murphy-Campe Equation 6. This was done in order to utilize the X/Q equation included in the computer code used at ComEd and enable an assessment using the Murphy-Campe methodology.

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Reference 3 states that ComEd used an approach detailed in Meteorology and Atomic Energy -1968, Section 3-3.5.2; in actuality the X/Q model applicable to Byron and used in the UFSAR is taken from the Murphy-Campe paper.

If you have any questions concerning this correspondence, please contact Denise Saccomando at (630) 663-7283.

Sincerely,

John B. Hosmer

John B. Hosmer
Engineering Vice President

Attachment

cc: D. Lynch, Senior Project Manager-NRR
G. Dick, Byron/Braidwood Project Manger-NRR
S. Burgess, Senior Resident Inspector-Byron
A.B. Beach, Regional Administrator-RIII
Office of Nuclear Safety-IDNS

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ATTACHMENT

REQUEST FOR ADDITIONAL INFORMATION
RELATED TO THE PROPOSED REDUCTION
IN THE BYRON UNIT 1 DOSE EQUIVALENT IODINE-131

NRC Question # 1:

Table 6.4-1a of the Byron Station UFSAR provides information regarding the values of the atmospheric dispersion factors, X/Q, which are used in dose assessments when evaluating the control room habitability for design basis accidents. State what additional parameters and assumptions were used in your calculations to determine the various values of X/Q in Table 6.4-1a. These parameters should include the wind speeds at the 5, 10, 20, and 40 percentile levels, values of sigma y and sigma z, the period over which the meteorological data was acquired, the wind directions used to calculate the X/Q values and, if appropriate, building measurements (i.e. diameter) and the building cross-sectional area. State which Murphy-Campe equation you used and your basis for the use of the applicable equation. Finally, provide the input parameters and assumptions you used in determining the maximum X/Q value over the time period of 0 to 8 hours.

Byron Response:

All additional parameters and assumptions used in determining Table 6.4-1a X/Q are documented below.

The 5th percentile wind speed is 0.655 m/s which was obtained from a cumulative probability distribution analysis using FSAR Table 2.3-25 meteorological data. This table was compiled from on-site meteorology data collected over a three-year period of record (Jan. 1, 1974-Dec. 31, 1976). The maximum X/Q value was determined to be that for winds blowing from the north containment (unit 2) in an easterly direction (98 degrees east of north) to the control room intake, located inside the Turbine Building, on the auxiliary building/ turbine building common wall, 100 feet distant (in plan view) from the containment surface. The turbine building structure is assumed to be non-existent.

The percentile levels associated with time periods are in accordance with the Murphy-Campe paper presented at the 13th AEC Air Cleaning Conference in August 1974. Only the data associated with the 5th percentile is used in the steam line break analysis. The remaining data is applicable to the control room dose assessment for the Loss of Coolant Accident, which is considered to be an upper bound of all accidents postulated to occur per UFSAR Section 6.4.4.1. The wind speeds and associated data for each percentile level are as follows:

Percentile Level	Time Period (hr)	Wind Speed (m/sec)
5	0-8	0.655
10	8-24	1.18
20	24-96	1.97
40	96-720	3.30

The X/Q model applicable to Byron and used in the UFSAR LOCA assessments is derived from equation 6 of the Murphy-Campe paper. This equation models the postulated PWR LOCA single containment model where leakage from the containment to the environment is assumed to be from a "porous" containment (the Murphy-Campe diffuse source) to the atmosphere and then to a point receiver [the control room air intake]. The equation below does not include the term with values of sigma-y and sigma-z included in the Murphy-Campe Equation 6 because this term is negligible compared to A/(2+K) term. The equation used in the Byron LOCA control room assessment is:

$X/Q = [2+K]/uA$, where

$K = 3/(s/d)^{1.4}$
s = distance from containment surface to the intake
d = containment diameter
A= the cross sectional area of the building causing the downwind turbulent wake=2700 m^2

For Byron, d = 147 feet
and s = 100 feet (assumes turbine building is not in place.)
Then K = 5.169

$X/Q = [2+5.169]/(0.655 \text{ m/sec} \times 2700 \text{ m}^2)$
$= 4.05E\text{-}3 \text{ sec/ m}^3$

This X/Q model used does not require values of sigma y and sigma z and is considered to provide a conservative estimate of atmospheric dispersion (X/Q) for the present analysis, given the complexity of multiple structures on site, and the location of the control room air intakes (within the turbine building).